

# QUEST

ADVENTURES IN THE WORLD OF SCIENCE

## WARFARE

## 40

**FACT FILES ON:**

- ▶ *Killer choppers*
- ▶ *Electronic bomb sniffers*
- ▶ *Laser weapons*
- ▶ *Cluster bombs*
- ▶ *Stalking prey*
- ▶ *Dummies and decoys*
- ▶ *Urban combat*

## MAKE A ROCKET LAUNCHER

## THREE PROJECTS

## GIANT POSTER: BULLDOG ANT



# INSIDE THIS PACK

## FACT FILES

- ▶ Subterfuge in war
- ▶ Gunships
- ▶ Animal camouflage
- ▶ Stealth bombers
- ▶ Street warfare
- ▶ Anti-terrorist techniques
- ▶ Battlefield lasers



**POSTER** The bulldog ant

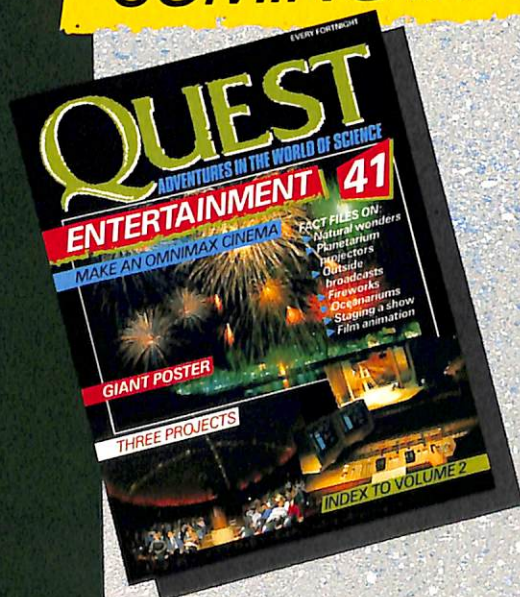


**MODEL**  
Rocket launcher

**THREE  
SCIENTIFIC  
PROJECTS**



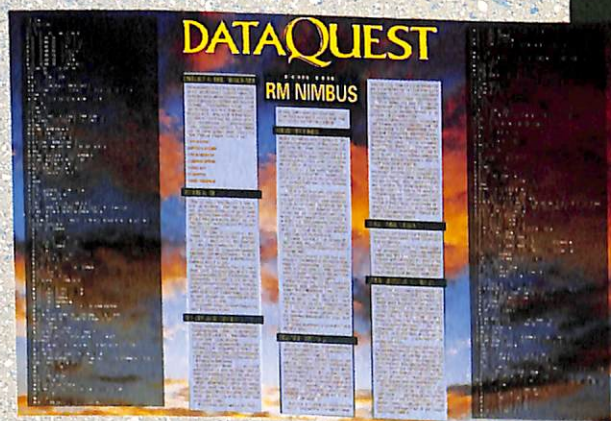
## COMING IN QUEST 41 ENTERTAINMENT



**MODEL**  
Omnimax cinema

## FACT FILES INCLUDE:

- ▶ Natural spectacles
- ▶ Fireworks
- ▶ Planetariums
- ▶ Animation
- ▶ Staging a show
- ▶ TV outside broadcasts
- ▶ Ocean worlds



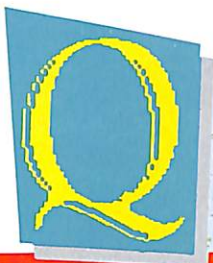
**POSTER**  
Nimbus computer database

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# PROJECTS

## WARFARE

Find out why a ballistic missile cannot fly straight to its target.

### TRAJECTORY



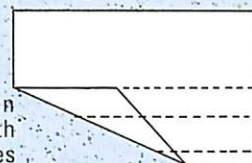
Ballistic missiles, including bullets, have to follow a curved path in order to reach their targets.

Gravity acting downwards on a projectile means that it does not travel from a weapon to target in straight lines. In order to hit a target, the projectile travels in a curved, vertical path called a trajectory. Make a folded paper dart as shown and see how far it flies as the trajectory – the vertical curved path – varies. You will find that the higher the trajectory, the further the dart flies. All ballistic missiles – those that fly under force of gravity only – including bullets, rely on a carefully computed trajectory to hit their targets.

paper dart



Take a sheet of A4 writing paper and fold it in half. Fold the top corners in to meet the centre, then fold the folded edge as well.



fold a  
fold b

Fold it in half, along A, then back, along B. Finish with flaps and turn the wing edges up vertically as shown.



trajectory of dart

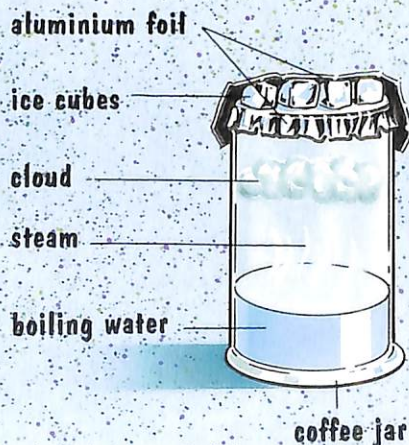


## ADVENTURES IN THE WORLD OF SCIENCE

### MAKE A CLOUD



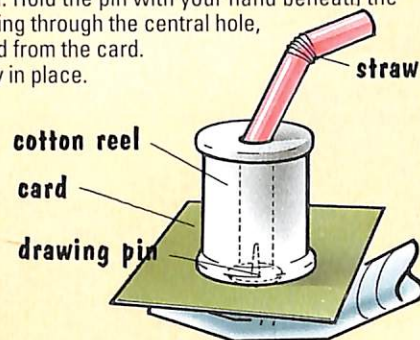
You need a clean glass jar, such as a coffee jar, boiling water, aluminium foil, a pair of scissors and ice cubes. Cut the foil into two squares, large enough to cover the top of the jar. Carefully pour about 2 cm of boiling water into the jar. Place the first sheet of foil loosely over the jar and fold it firmly to the neck. Place the ice on top, then cover with the second sheet of foil, securing that to the neck as before. Sometimes a cloud will not form but the steam from the hot water will condense on the aluminium foil and droplets of 'rain' will fall.



### AIR PRESSURE



You will need a cotton reel, a light piece of card about 10 x 10 cm and a drawing pin. Draw two diagonal lines to find the centre of the card. Push the pin through the centre of the card and place the central hole of the cotton reel over the pin as shown. Hold the pin with your hand beneath the card. While blowing through the central hole, remove your hand from the card. The card will stay in place.



### PROJECT INFORMATION



Each QUEST project and model has its own difficulty rating: 1 very simple, 2 simple, 3 intermediate, 4 advanced, 5 complicated.

### WARNING!

Every care has been taken to ensure projects are as safe as possible. However, parents should supervise all projects. The publisher can accept no liability for injury.





# MODEL

## ASSEMBLY INSTRUCTIONS

1 2 3 4

# ROCKET LAUNCHER

### You will need

Scissors • Ruler • Craft knife • Glue • Shirring elastic • 10 cm length of narrow dowling

Before cutting out the pieces, score along all broken lines with a blunt edge and ruler to make folding and gluing easier. Study the ASSEMBLY DIAGRAM to see how the pieces fit together, and use the dotted lines as a guide for positioning.

**NB** Younger children will need supervision when using a craft knife.

### To make up

#### Rocket (ballistic-missile interceptor)

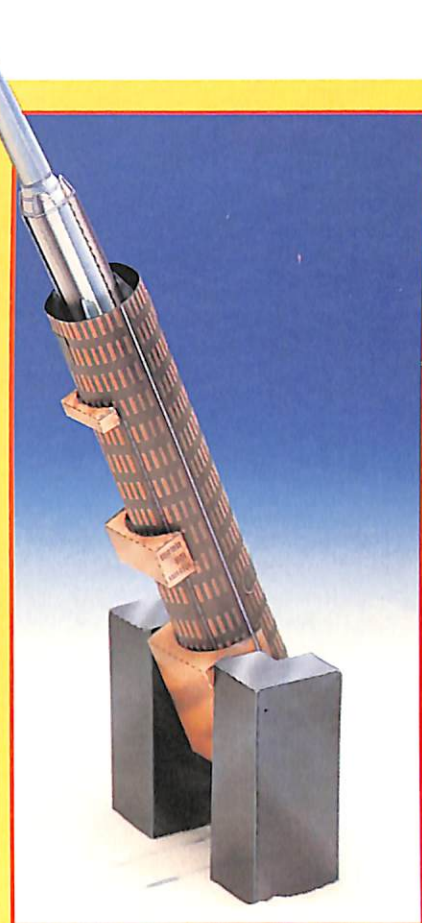
- 1 Cut out rocket casing **A** and form into tube shape. Cut out **B**, glue into cone shape and then glue **B** on to tabs at one end of **A**.
- 2 Cut out casing **C**, spread glue along flap and form into tube. Glue **C** to tabs on **B**. Cut out nose cone **D** and glue tabs on **C**.
- 3 Cut out strap-on booster **E** and shape, gluing down small fold to create curve at top and folding two tiny tabs inwards. Also fold two large flaps inwards until flap edges touch each other. Glue **E** to **A**, following positioning marks. Repeat with other three booster rockets marked **E**.
- 4 Cut out fin **F**, fold down flap and glue along positioning dots on **E**. Repeat with other three fins **F**.
- 5 Cut out **G** and glue to folded down tabs on **A**, aligning each semi-circle on **G** with base

of each part **E**. Cut out divergent exhaust nozzle **H** and form into cone. Fold down tab and glue to dotted circle on **G**. Repeat with other three nozzles marked **H**.

#### Launcher

**NB** Cut hole with craft knife at centre of all crosses marked on parts.

- 1 To make launch pad, cut out **I** and fold down tabs; then cut out **J** and wrap around **I**, gluing **J** to tabs.
- 2 Cut out support **K** and fold to shape. Glue flaps in place. Cut out **L** and glue to flaps on open side of **K**. Cut out **M** and glue into shape. To finish left-hand support, stick **M** into open corner of **K** and **L**. To make up right-hand support, repeat with **N**, **O** and **P**.
- 3 Cut out launch tube **Q**, remembering to make holes in two crosses. Form **Q** into tube shape. Cut out launcher cradle **S** and fold to shape. Glue folded down tabs on to **Q**, following positioning dots and making sure that all exterior pipework aligns.
- 4 Cut out launcher cradle **S** and fold to shape. Glue folded down tabs on to **Q**, following positioning dots (see ASSEMBLY DIAGRAM). Repeat with cradle **T**.



#### Launch mechanism

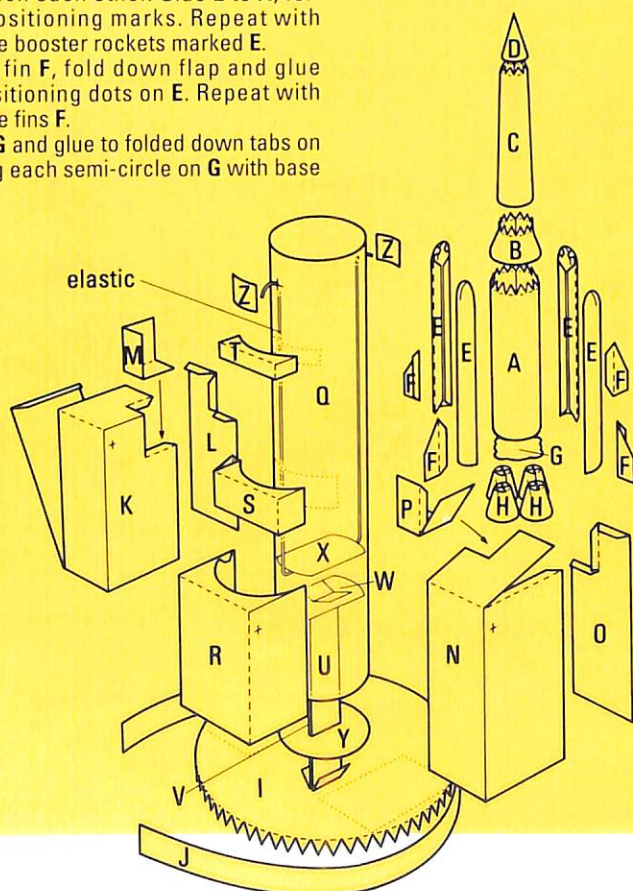
- 1 Cut out parts **U** and **V**. Glue white sides of mid-sections of **U** and **V** together, but not ends beyond broken lines. Cut out part **W** and make slit where indicated. Thread one end of **U/V** through slit in **W**, then fold flaps on that end of **U/V** out and glue flaps down on back of **W**.
- 2 Cut roughly 30 cm of shirring elastic. Lay mid-point of elastic across centre of **W**, so that elastic runs parallel to longer sides of **W**. Cut out **X** and glue to **W**, sticking elastic down between them. Thread one end of elastic through hole in **Q**, from inside to outside of tube. Thread other end of elastic through other hole in same way.
- 3 Lower rocket down launch tube until just nose cone is visible, with rocket base resting on **W/X**. (**NB** Do not stretch elastic.) Cut out two parts marked **Z** and glue them on to outside surface of **Q**, over the two holes, so that elastic is glued into place. Trim ends of elastic.
- 4 Cut out launch tube base **Y**, including slit. Thread free end of **U/V** through slit in **Y**, fold flaps back and glue to sides of **U/V** (so that end of **U/V** will not slip back through slit). Check that elastic is not twisted. Glue **Y** to tabs on **Q**.

#### To finish

Glue two launcher supports into position on base **I**, following dotted lines. Place launch tube between supports. Push 10-cm-long piece of narrow dowling through hole at cross on outer side of **K**, hole on inner side, holes on both sides of **R**, and, finally, holes on inner and outer sides of **N**. Trim projecting ends of dowling.

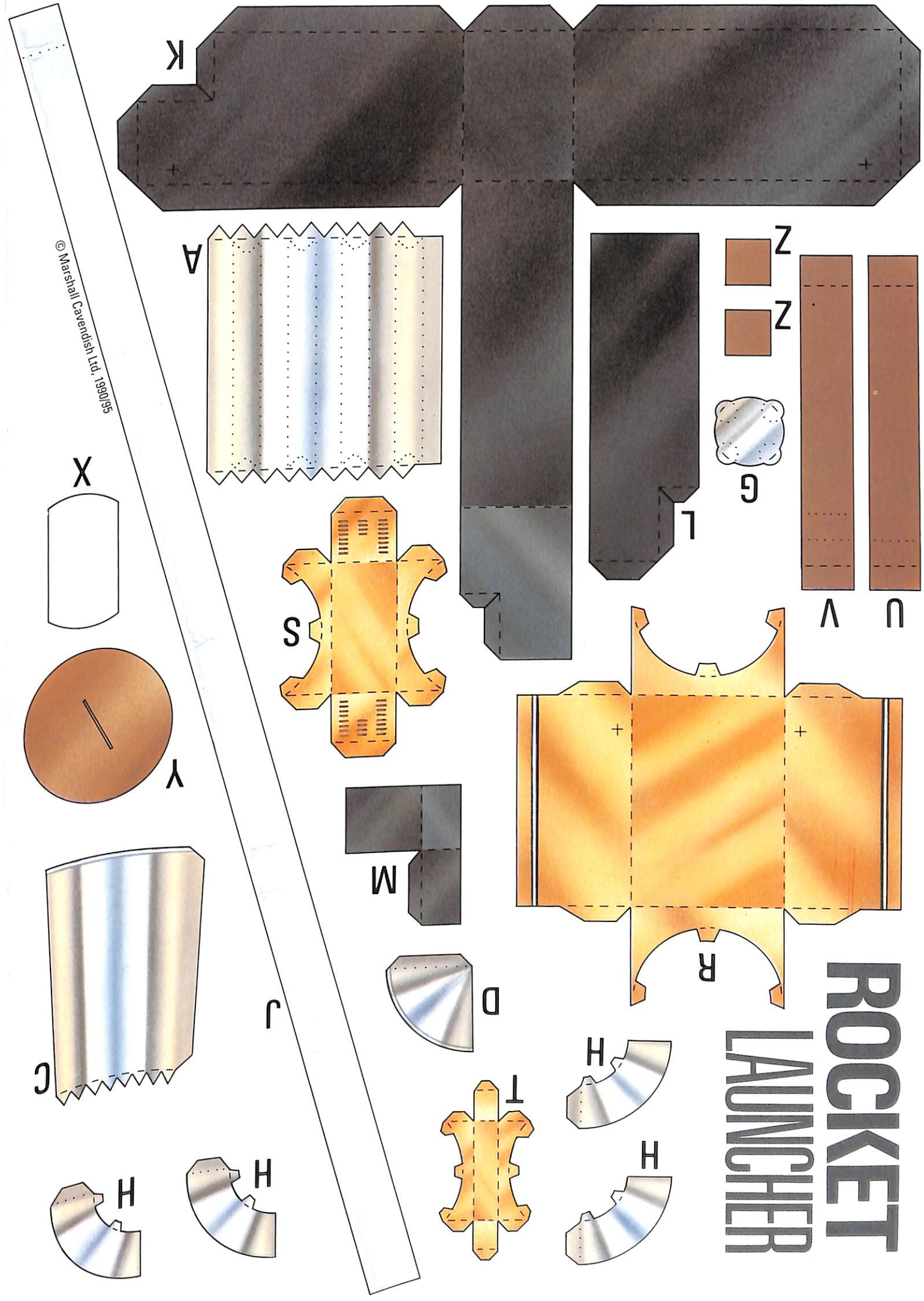
#### To launch rocket

Lower rocket into launch tube. Pull end of **U/V** back as far as possible and let go. The rocket will shoot 'into space'.



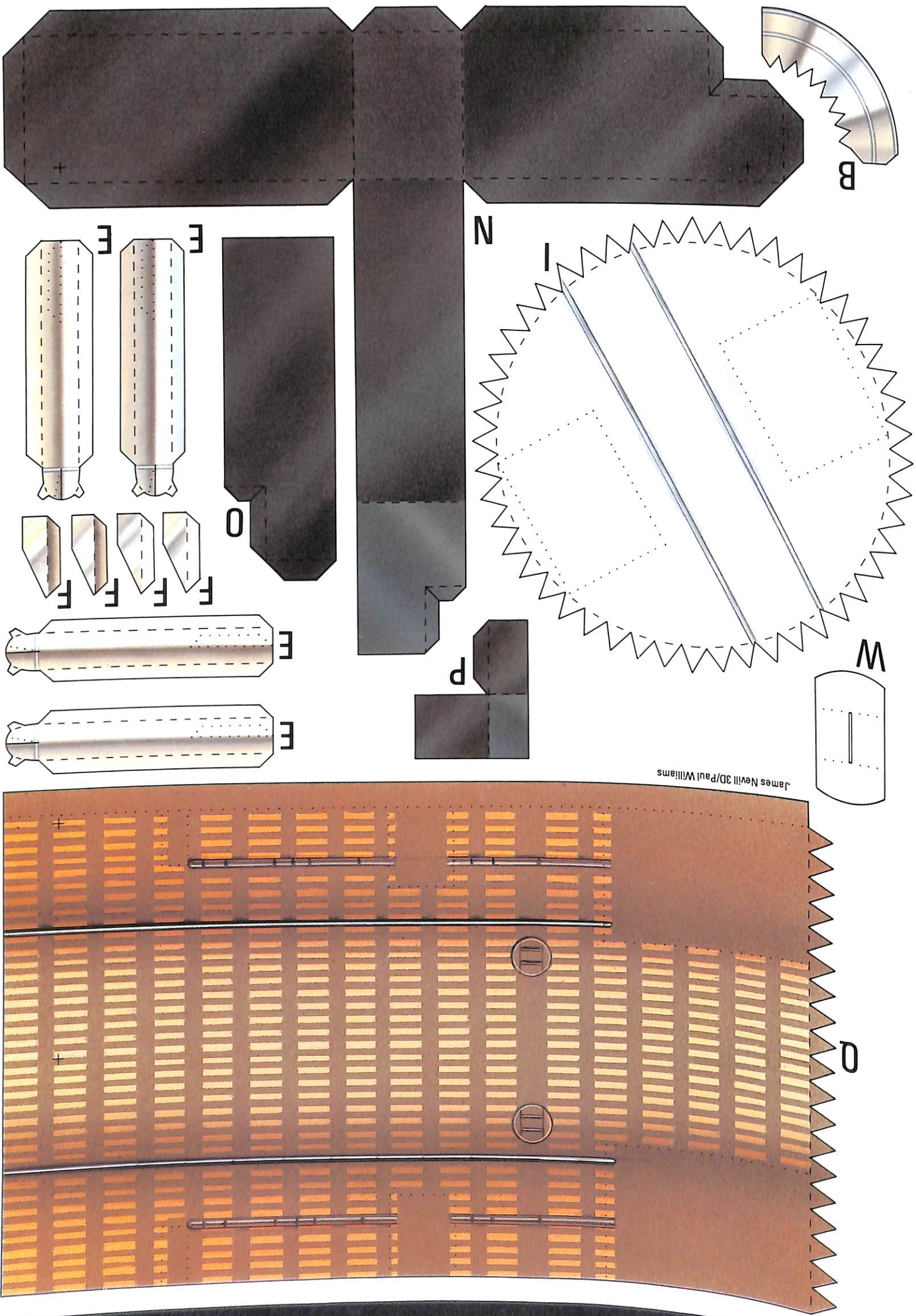


# ROCKET LAUNCHER



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James Nevill 3D/Paul Williams





THE FORMIDABLE WEAPONRY OF THE BULLDOG ANT

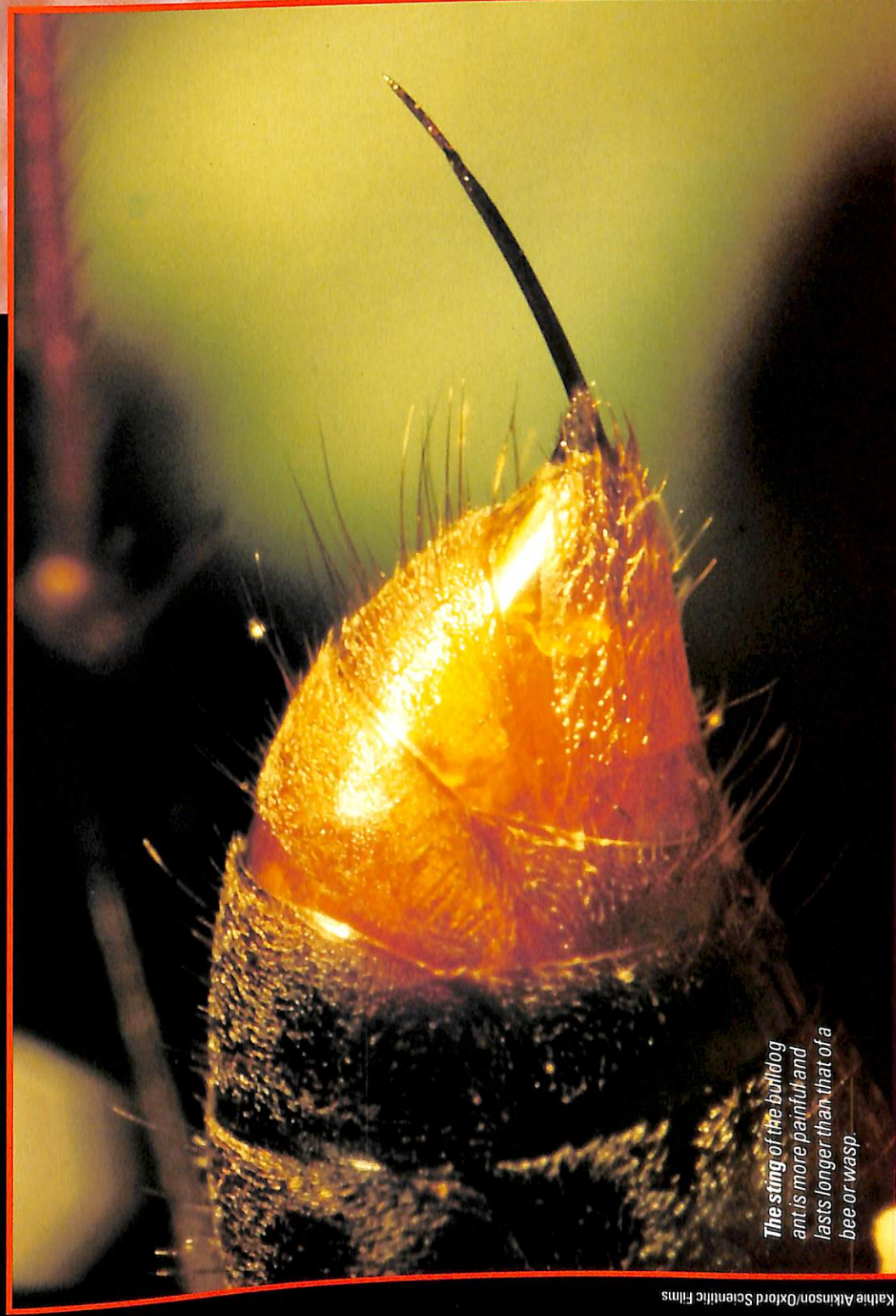
# INSECT W



*A lone hunter, the bulldog ant is more than a match for any insect that crosses its path – and humans better watch out, too!*

Mantis Wildlife Films/Oxford Scientific Films

Gerald Thompson/Oxford Scientific Films



*The sting of the bulldog ant is more painful and lasts longer than that of a bee or wasp.*

Kathie Atkinson/Oxford Scientific Films



# WARRIOR



## RAGING BULL

Throughout Australia and Tasmania, few insects are more feared than the bulldog (or 'bull') ant. All ants are related to bees and wasps and the bulldog is closer than most, having a vicious sting in its tail and fearsome, toothed jaws. When it attacks a human being, the results are spectacular – an arm or leg can swell up like a football. In rare cases, death can result, as happened in 1963 when a Tasmanian woman was stung on the foot in her garden. She died in 15 minutes.

The bulldog ant is a mainly solitary hunter – its armoury and size (workers of some species have been recorded as 37 mm in length, the longest ant in the world) mean that it need not adopt the 'safety in numbers' approach of most ants. Occasionally, however, a raiding party has been known to attack a termites' nest.

A bulldog ant kills by wrapping its body around its victim and simultaneously biting and stinging it to death. It then drags the prey back to its nest. This may be an earth mound or cone up to 45 cm high and 1 to 2 metres deep, criss-crossed with tunnels and chambers and containing up to 1000 ants. When its nest is threatened, the bulldog ant is not only a fearless opponent, it has a frightening surprise-attack strategy: using its huge jaws as a spring-board it leaps backwards from the ground to sting anything or anyone that comes too close.

QUEST



